Developing Biological Indicators: Lessons Learned from Mid-Atlantic Streams

Wayne Davis
Environmental Scientist
OEI/MAIA Team/OW Biocriteria Team
(410) 305-3030
davis.wayne@epa.gov

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As part of the U.S. Environmental Protection Agency's (USEPA) Environmental Monitoring and Assessment Program (EMAP), a survey of water chemistry, land use, riparian condition, and channel morphology was conducted to understand how human influence alters fish, invertebrate and periphyton assemblages. During 1993-1996, 296 sites were sampled for fish, 583 for invertebrates and 317 for periphyton. A primary goal of the Mid-Atlantic Integrated Assessment (MAIA) study was to define biological indicators for each assemblage that could be used to assess stream condition at the regional level.

During the course of the project, researchers working independently derived different approaches to data analysis and reported different results regarding the relationship between human influence
and biological change. To build consensus among the scientists involved, USEPA sponsored a series of workshops to create a consistent approach for testing and selecting biological indicators for fish, invertebrates and periphyton. This document presents some of the issues from those workshops that were most challenging to resolve.

Key findings showed the probabilistic sampling approach was the most efficient method for obtaining an unbiased estimate of regional condition, one of the greatest challenges overcome for the MAIA project was selecting the best measure of human disturbance from among the hundreds of potential variables, and the indexes for each assemblage represent statistically reliable and biological meaningful monitoring tools for assessing and reporting the biological condition of wadeable streams in the Mid-Atlantic.